

REMARKS

On page 3 of the Official Action mailed on January 20, 2006, claims 1 - 6, 11, and 12 were rejected under 35 USC 103(a) as unpatentable over Ito et al (U.S. Patent No. 6,867,982, referred to below as Ito) in view of Choon et al (U.S. Patent No. 5,608,188, referred to below as Choon). The Official Action does not specifically state that there are any art rejections of claims 13 - 16, but pages 6 and 7 of the Official Action appear to give reasons why claims 13 - 16 are also considered to be obvious, so it will be assumed that claims 13 - 16 were also rejected under 35 USC 103(a) as obvious over Ito in view of Choon.

This rejection is respectfully traversed. The rejection is improper firstly because the cited references do not teach all the features of the rejected claims, and secondly because the references provide no motivation for a person skilled in the art to combine them in the manner proposed in the Official Action.

The sufficiency of the teachings in the references will first be discussed. Claim 1 describes a cap-shaped lid including a lip extending outwards from an outer surface of a wall structure by 10 - 500 μm . Neither of the cited references discloses or suggests such an arrangement.

Ito discloses a high-frequency component including a ceramic substrate 1 and a metal cover 2 attached to an electrode pad 5 on the substrate 1 by solder. (Contrary to the statement on page 3 of the Official Action, there is no disclosure in Ito that the

cover 2 seals an electronic device. All that is known from the disclosure is that the cover 2 is attached to the electrode pad 5). As acknowledged by the Official Action, Ito does not disclose a lip extending outwards from an outer surface of a wall structure by 10 - 500 μm as set forth in claim 1.

Choon discloses a multi-component electromagnetic shield formed by stamping and forming of sheet metal. It includes a box-like enclosure 101 having curved mounting edges 503 formed on the lower ends of its walls. The Official Action relies on column 3, lines 59 - 61 of Choon as supposedly teaching a lip extending from the outer surface of the walls of the enclosure 101 by 10 - 500 μm , and the Official Action proposes to modify the invention of Ito to make the flange of the cover 2 of Ito extend from the wall of the cover 2 by 10 - 500 μm .

However, Choon does not teach a lip extending from a wall structure by 10 - 500 μm . It merely teaches that mounting edges 503 of a shield 100 are bent to give them a bending radius of 0.2 mm. There is no disclosure in Choon of how far the mounting edges 503 extend from the outer walls of the shield 100; only the radius of curvature is disclosed. As such, Choon contains no teaching of a lip extending outwards from an outer surface of a wall structure by 10 - 500 μm as set forth in claim 1 or by any specific distance. Therefore, the cited references do not include all the elements of claim 1, so they cannot be combined so as to result in an arrangement having all the features of claim 1 and cannot render this claim obvious.

Page 2 of the Official Action contains a calculation showing

that the mounting edges 503 in Figure 4 of Choon have an arc length of 17 to 315 μm , but this calculation is not relevant to claim 1, since claim 1 does not recite an arc length. Claim 1 states that a lip "extends outwards from an outer surface of the wall structure by 10 - 500 μm ", and this distance, which is defined on page 6, lines 8 - 24 of the specification, is completely different from the arc length. Furthermore, this calculation is based on an assumption that Figure 4 is anything more than a schematic, and since there is no disclosure in Choon in this regard, there is no basis for asserting that Choon teaches that its mounting edges 503 extend outwards by any specific distance. All that is known about the mounting edges 503 is their radius of curvature.

The rejection is also improper because a person skilled in the art would have received no motivation from the cited references to combine them in the manner proposed by the Official Action. Even if it were assumed that Choon actually taught that its mounting edges 503 extended from the walls of the enclosure 101 by a distance in the range of 10 - 500 μm , a person skilled in the art would find no motivation from Choon to modify the structure disclosed in Ito so as to form the flanges of the cover 2 of Ito into a curved shape like that employed for the mounting edges 503 in Choon. Choon teaches the formation of rounded mounting edges 503 on isolated, intermittent regions spaced around the periphery of a metal enclosure 101. The flange of the cover 2 of Ito, however, extends around the entire periphery of the cover 2. Choon does not teach how or even suggest the

possibility of forming a curved mounting edge 503 around the entire periphery of a cover like the cover 2 of Ito. Given the quite different structure of the mounting edges 503 of Choon and the peripheral flange of the cover 2 of Ito, a person skilled in the art would see no applicability of the mounting edge structure used in Choon to the cover of Ito.

Page 2 of the Official Action states regarding its proposed modification of Ito that "the combination is not the lips taught by Choon with the cap shaped lip structure taught by Ito, the combination is the entire structure taught by Ito with the lips protruding the distance taught by Choon." However, for the Official Action to select only a certain feature of Choon (the feature that its mounting edges 503 supposedly extend outwards by a certain distance) while ignoring the very specific context in which those mounting edges 503 exist constitutes "cherry picking". Choon does not even disclose why it imparts a curvature to its mounting edges 503 or whether there is a need for them to extend outwards by a certain distance. Thus, there is no general teaching in Choon concerning how far the mounting edges of a shield should extend outwards. All that can be said about Choon is that it teaches a very particular sheet metal structure for an electromagnetic shield which is totally different in structure from the metal cover 2 of Ito.

Accordingly, since neither of the cited references teaches a lip extending outwards from an outer surface of a wall structure by 10 - 500 μm , it is impossible for the references to be combined so as to result in an arrangement having all the

features recited in the rejected claims. Furthermore, since the references provide no motivation to combine them in the manner proposed by the Official Action, the proposed combination of references is unreasonable, and the rejection fails to set forth a *prima facie* case of obviousness. Claim 1 and claims 2 - 6, and 11 - 16 which depend from claim 1 are therefore allowable.

Claim 5 further patentably distinguishes the present invention from the cited references. Claim 5 states that solder is provided on the entire inner surface of the lid of claim 1. The Official Action states that column 4, lines 22 - 23 and 33 - 36 of Ito state that the metal cover 2 of Ito has solder on its entire surface, but Ito does not in fact contain such a statement. Ito merely states that an inner surface of the metal cover 2 is solder plated and that the outer surface B thereof is nickel plated. There is no description of the extent of the solder plating, and thus there is no basis for concluding that the cover 2 has solder on its entire surface. The passage at the top of page 3 of the Official Action argues that the fact that Ito states that its cover has two sides and that the inner surface is provided with solder necessarily means that the entire inner surface is provided with solder. However, given that techniques for plating a limited region of a surface are well known and widely employed, there is no scientific (not to mention grammatical) basis for reading the words "the entire surface" into the disclosure of Ito and thus no basis for asserting that the entire surface of the cover 2 of Ito has solder on it in the

absence of a specific disclosure of such a fact.

In Choon, the electromagnetic shield 100 appears to be connected to a carrier 201 by reflow of a solder paste, and there is no description of the shield having solder provided anywhere thereon.

Thus, neither reference discloses or suggests a lid having solder provided on an entire surface thereof as set forth in claim 5, so the references cannot render claim 5 obvious.

Claim 6 further patentably distinguishes the present invention from the cited references. Claim 6 describes a packaged electronic part having a lid which hermetically seals an electronic device inside the package. Neither of the cited references discloses or suggests a lid which seals an electronic device inside a package. In Ito, the metal cover 2 includes a hole 4, so the interior of the cover 2 is open to the atmosphere, and the cover 2 clearly does not hermetically seal anything inside a package. Similarly, the electromagnetic shield 100 disclosed in Choon has a number of openings at its corners, at its lower edges, and at the locating slots 407, 409 for receiving tabs of a partition 103. As a result, the interior of the shield 100 is open to the atmosphere, and there is no formation of a hermetic seal as set forth in claim 6. Even without the various openings, there is no disclosure that the manner in which the metal cover 2 of Ito is attached to a substrate 1 or the manner in which the shield 100 of Choon is joined to a carrier 201 is capable of forming an airtight join necessary to form a hermetic

seal.

With respect to claim 6, page 5 of the Official Action acknowledges that Ito does not teach a lid which hermetically seals an electronic device inside a package, but asserts that it would have been obvious to have modified Ito to create a hermetic seal, and even suggests ways of accomplishing a hermetic seal ("by using a suitable adhesive with a closed housing, or in the case of Ito's lid it can be accomplished by laminating the lid cover upon the hole"). It is certainly conceivable that a person skilled in the art could devise many ways of modifying Ito, but the mere possibility of modifying a reference is not terribly pertinent to a determination of obviousness. The important question is what the prior art of record teaches and suggests, and the fact is that the Official Action does not actually cite any prior art which suggests such a modification of Ito, nor has the Official Action shown any teachings in the references which demonstrate that either of the references forms or is capable of forming a seal between a shield and a base. The Applicants cannot be expected to respond to a rejection based on *hypothetical* prior art, only on the prior art which is genuinely of record in the application. Given that the actual prior art which has actually been cited does not suggest the proposed modification of Ito, the rejection of claim 6 fails to set forth a *prima facie* case of obviousness.

Claim 12 further patentably distinguishes the present invention from the cited references. Claim 12 states that the

solder layer set forth in claim 5 is formed by hot dipping. Neither of the references discloses or suggests a lid having a hot dipped solder layer.

As stated above, in Choon, the shield 100 appears to be attached to a carrier 201 by solder paste. In Ito, column 4, lines 22 - 24 state that the inner surface of the metal cover 2 is preferably solder-plated. Ito does not specify how the solder plating is formed, but from context, it is clear that it is formed by electroplating. This is because in the same sentence, Ito states that the outer surface of the cover 2 is nickel-plated, and nickel plating of electronic parts is invariably carried out by electroplating, due to the very high melting of Ni. Therefore, when Ito refers to plating, it means electroplating. As such, neither reference discloses a layer of solder formed by hot dipping, as in claim 12.

The limitation in claim 12 that the solder layer is formed by hot dipping is not only a process limitation but is also a physical limitation of the resulting lid, since a hot dipped layer is physically distinguishable from an electroplated solder layer. A principal difference between the two is their thicknesses. An electroplated solder layer is extremely thin, and is typically on the order of 1 - 3 μm thick. Before of this very low thickness, an electroplated solder layer is incapable of forming a hermetic seal between a cover and a base, since the electroplated layer does not provide enough solder for the purpose.

In contrast, a hot dipped solder layer is much thicker. The

minimum thickness that can be achieved by hot dipping of solder is around 10 μm , and much larger thicknesses can be achieved. For example, page 10, line 3 of the present application describes an example of a lid having a hot dipped solder layer with a thickness of 20 μm .

On account of the considerable thickness of a hot dipped solder layer, when such a layer is formed on the inner surface of a lid, it provides enough solder to be able to form a hermetic seal between a lid and a base, particularly when the solder layer extends along the inner surface of the side walls of the lid. As described on page 8, lines 24 - 27 of the specification of the present application, when a lid with a hot dipped solder layer is heated in a reflow furnace, the solder on the inner surface of the lid melts. The molten solder on the inner surface of the side walls of the lid is drawn downwards by the molten solder present between the lip of the lid and the base to which the lid is being attached. As a result, a large amount of solder accumulates at the bottom of the wall structure and forms a solder joint in the vicinity of the lip. As shown in Figure 4, the molten solder which accumulates in this manner forms a fillet on the inner side of the lip, and the fillet provides a large area of contact between the solder and the base on which the lid is mounted. On account of the large amount of solder which accumulates, the joint between the lid and the base forms a hermetic seal. This effect cannot be achieved with an electroplated solder layer such as is used in Ito for lack of enough solder. Neither of the references shows any realization

of the possibility of forming a hermetic seal even when the region of contact between the lip of a lid and a base is extremely small by employing a hot dipped solder layer on the inner surface of the lid.

Yet another physical difference between the structure of a hot dipped solder layer and an electroplated layer is that hot dipping results in the formation of intermetallic compounds which produce a strong bond between the solder layer and the base metal of the lid, whereas electroplating does not form such intermetallic compounds.

Thus, since neither of the cited references suggests a hot dipped solder layer as set forth in claim 12, they cannot render this claim obvious.

With respect to claim 12, page 5 of the Official Action implies that the feature of claim 12 that the solder layer is formed by hot dipping is not a structural limitation. It is believed that the preceding five paragraphs demonstrate that it is very much a structural limitation that is not taught or suggested by the cited references.

Claim 13 further patentably distinguishes the present invention from the cited references by reciting that the wall structure, the top portion, and the lip are without openings through which air can pass. Neither Ito nor Choon discloses such a structure. Page 6 of the Official Action states with respect to this claim that it would have been obvious to have modified Ito's cover to render the top portion of the cover without

openings through which air can pass, but the Official Action has not cited any prior art which either teaches such a feature or provides motivation for such a modification. As discussed above with respect to claim 6, the Applicants can only be expected to respond to rejections based on prior art which has actually been cited in the application. Since the Official Action does not set forth prior art which teaches the proposed modification of Ito or provides motivation for the modification, the rejection of claim 13 fails to set forth a *prima facie* case of obviousness.

Claim 14 further patentably distinguishes the present invention from the cited references by reciting that the lip of claim 1 extends outwards from the outer surface of the wall structure by 10 - 100 μm . As discussed above with respect to claim 1, there is no teaching in the references of a lip which extends from a wall by an amount in this range.

Page 7 of the Official Action states that "since the outer surface has many points of reference we can always find some place on the outer surface that measures in between any given range." However, this statement conflicts with the definition on page 6 of the specification of the distance T by which the lip 4 projects outwards from the outer surface of the side walls 3 on which the lip 4 is formed. Since the claims must be interpreted in accordance this definition, it is incorrect to state that it is always possible to find a point on a lip which is between any given range.

As stated above with respect to claim 1, Choon contains no

disclosure of how far the mounting edges 503 of its shield 100 extend outwards from a wall. Even if it were assumed that the drawings of Choon are not mere schematics, the most that Figure 4 of Choon could be said to disclose is a mounting edge which is bent by 90° into the shape of a J. If such a bend had a radius of curvature of 0.2 mm, this means that the extremity of each mounting edge 503 would extend from the side wall of the shield 100 by 0.2 mm or 200 µm, which is twice the maximum value of the range set forth in claim 14. Thus, Choon clearly contains no teachings or suggestions to modify Ito so as to result in an arrangement as set forth in claim 14.

Claim 16 further patentably distinguishes the present invention from the references. Claim 16 recites a packaged part having a lid which has a hot dipped solder layer and which is soldered to a base to form a hermetic seal. As set forth above with respect to claim 12, a hot dipped solder layer is a structural limitation which is distinguishable from other types of layers such as an electroplated layer, and as set forth with respect to claim 6, neither of the cited references discloses or suggests forming a hermetic seal between a lid and a base, so these references cannot render claim 16 obvious.

It is important to note that neither of the prior art references cited in the Official Action is a lid for sealing an electronic device. Each is an electromagnetic shield having the purpose merely of covering an electronic device so as to provide

electromagnetic shielding. A shield has no need to form a hermetic seal to a substrate on which it is mounted; indeed, there not even any need for a shield to be enclosed, which is why it is permissible for the shields disclosed in Ito and Choon to have large openings formed therein. Given the lack of a need for a seal with an electromagnetic shield, techniques used for attached a shield to a substrate are of no relevance to a person interested in sealing a lid to a substrate, which is the object of the present invention.

As set forth on page 2 of the specification of the present application and as shown in Figures 6 and 7, it is known in the art to form a lid for sealing an electronic device with a large flange extending outwards from the side walls of the lid. While a large flange of this type is capable of forming a reliable seal between a lid and a base, the flange occupies a large area and so makes it difficult to reduce the size of the electronic part.

As set forth on pages 2 and 3 of the specification and as shown in Figures 8 and 9, it is also known to form a lid for sealing an electronic device with no flange whatsoever, but such a lid has the drawback that it is difficult to form a reliable seal between the lid and a base, since solder is not present between the bottom surface of the side walls of the lid and the top surface of the base.

For these reasons, in the past, there have been no proposals of a lid for sealing an electronic device having a minute lip like that set forth in the claims of this application, since it was thought that a wide flange was necessary to obtain a reliable

seal.

As stated above, Choon does not disclose how far its mounting edges 503 extend from the side walls of a shield 100, but even if the distance did fall within the range set forth for the lip of claim 1, the fact that Choon discloses an electromagnetic shield (with which there is no need to form a seal between the shield and the substrate) and not a lid for sealing an electronic device (with which the formation of a seal is of paramount importance) means that a person skilled in the art, if seeking to form a lid for sealing an electronic device, would not consider Choon to be of the slightest interest.

Given that Ito is also an electromagnetic shield, a person seeking to manufacture a lid for sealing an electronic device would have no reason to use Ito as a starting point. Even if a person skilled in the art were somehow motivated to try to modify Ito to prepare a lid for sealing an electronic device, he would have no reason to think of combining Ito with Choon, since Choon contains no teaching that it is capable of forming a seal between a lid and a base.

Thus, no one skilled in the art would find any reason to combine Ito and Choon in the manner proposed in the Official Action, and for this reason, none of the rejections sets forth a *prima facie* case of obviousness. All of the rejected claims are therefore allowable.

In light of the foregoing remarks, it is believed that the present application is in condition for allowance. Favorable

consideration is respectfully requested.

Respectfully submitted,



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